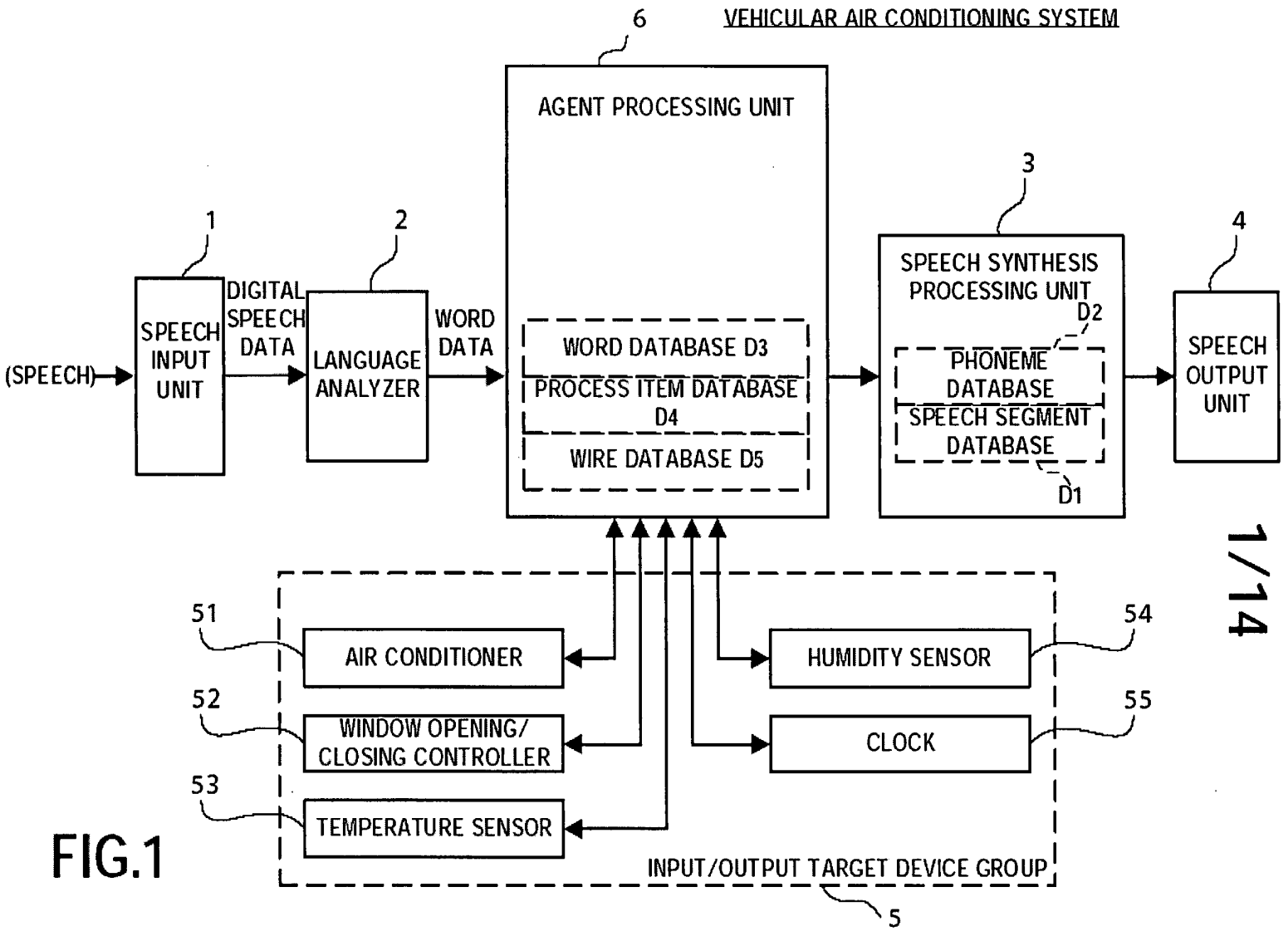

VEHICULAR AIR CONDITIONING SYSTEM
6
AGENT PROCESSING UNIT
WORD DATABASE D3
PROCESS ITEM DATABASE D4
WIRE DATABASE D5
1
SPEECH INPUT UNIT
(SPEECH)
DIGITAL SPEECH DATA
2
LANGUAGE ANALYZER
WORD DATA
3
SPEECH SYNTHESIS PROCESSING UNIT
D2
PHONEME DATABASE
SPEECH SEGMENT DATABASE
D1
4
SPEECH OUTPUT UNIT
51
AIR CONDITIONER
52
WINDOW OPENING/ CLOSING CONTROLLER
53
TEMPERATURE SENSOR
54
HUMIDITY SENSOR
55
CLOCK
INPUT/OUTPUT TARGET DEVICE GROUP
5

FIG.1

1/14

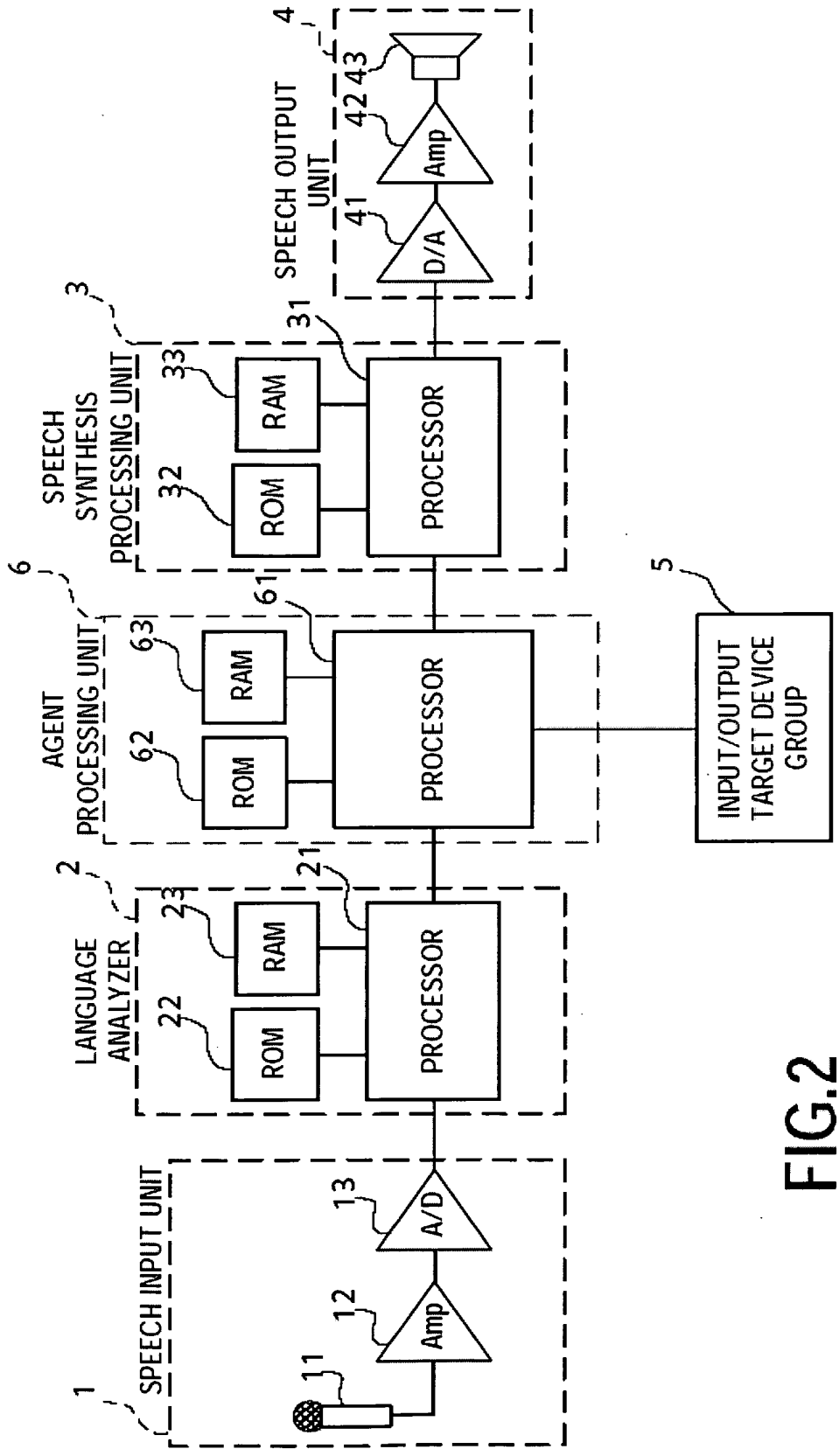
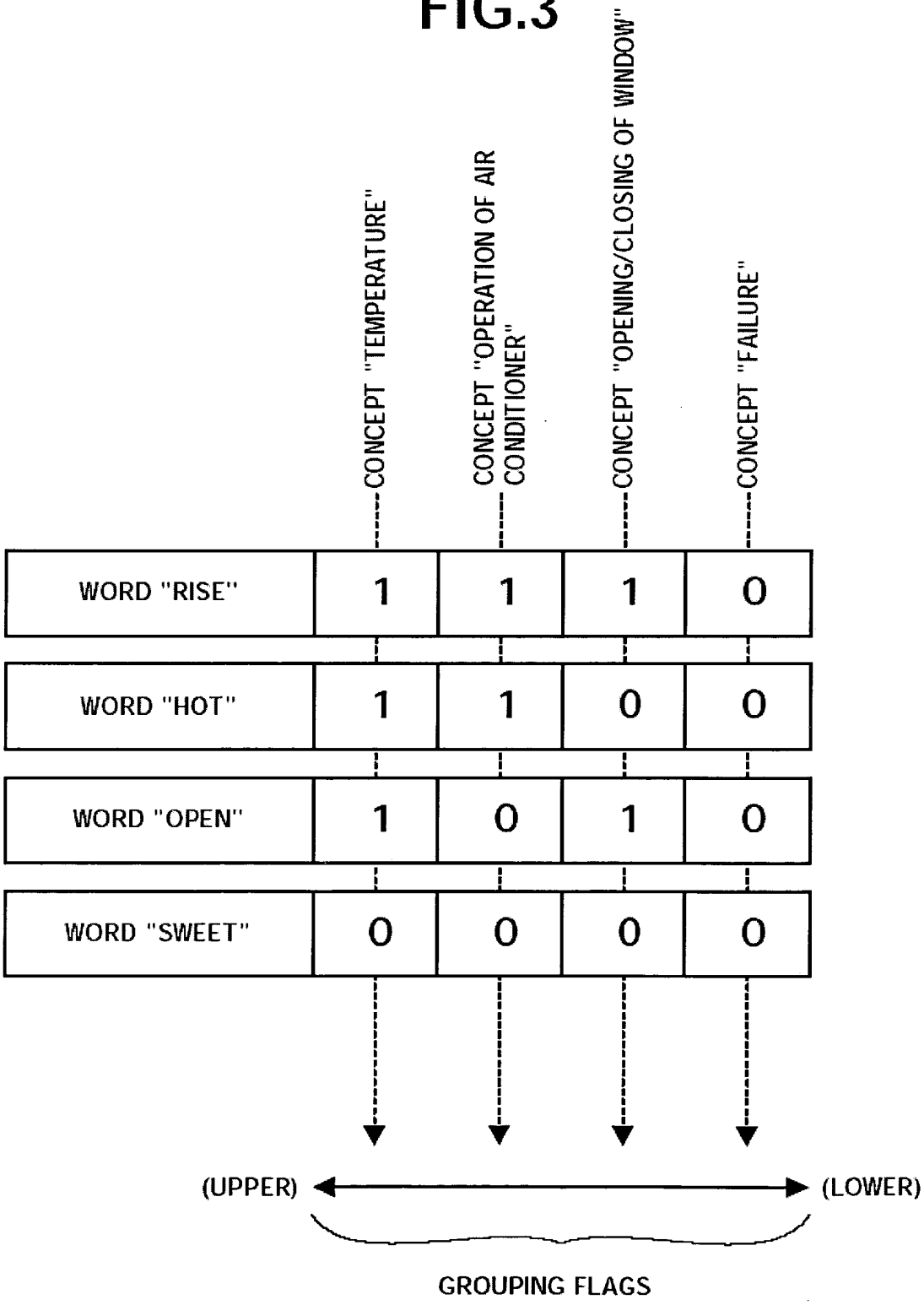

1
SPEECH INPUT UNIT
11
12
Amp
13
A/D
2
LANGUAGE ANALYZER
22
ROM
23
RAM
21
PROCESSOR
6
AGENT PROCESSING UNIT
62
ROM
63
RAM
61
PROCESSOR
3
SPEECH SYNTHESIS PROCESSING UNIT
32
ROM
33
RAM
31
PROCESSOR
4
SPEECH OUTPUT UNIT
41
D/A
42
Amp
43
5
INPUT/OUTPUT TARGET DEVICE GROUP

FIG.2

FIG.3


CONCEPT "TEMPERATURE"
CONCEPT "OPERATION OF AIR CONDITIONER"
CONCEPT "OPENING/CLOSING OF WINDOW"
CONCEPT "FAILURE"
WORD "RISE"
1
1
1
0
WORD "HOT"
1
1
0
0
WORD "OPEN"
1
0
1
0
WORD "SWEET"
0
0
0
0
(UPPER)
(LOWER)
GROUPING FLAGS

TRIGGER ACQUISITION PROCESS SYMBOL : TG	TRANSITION CONSTANT k
TG01 : HOT	0.8
TG02 : OPEN	0.7
TG03 : CONCEPT "TEMPERATURE"	0.5
TG04 : CONCEPT "OPERATION OF AIR CONDITIONER"	0.5
⋮	⋮

FIG.4A

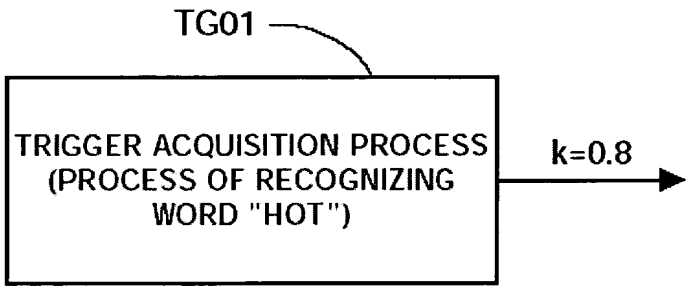


FIG.4B

DETERMINATION PROCESS SYMBOL : CNxx	TRANSITION CONSTANT k
CN01 : WINDOW OPEN?	Yes : 0.3 No : 0.4
CN02 : IS STATUS ON?	Yes : 0.5 No : 0.3
CN03 : IS ROOM TEMPERATURE 20℃ OR HIGHER?	Yes : 0.8 No : 0.5
⋮	⋮

FIG.5A

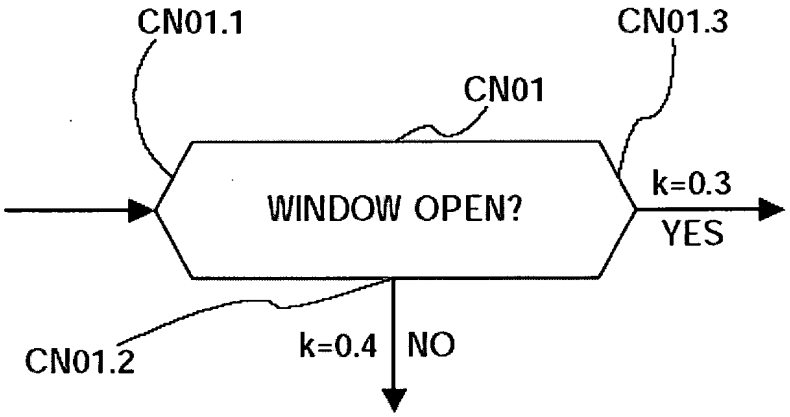


FIG.5B

DETERMINATION PROCESS (INQUIRY MADE) SYMBOL : QBxx	TRANSITION CONSTANT k
QB01 : OPEN WINDOW? OR ACTIVATE AIR CONDITIONER?	WINDOW :0.4 AIR CONDITIONER :0.7
QB02 : CLOSE WINDOW?	Yes 0.5 No 0.3
QB03 : RAISE TEMPERATURE?	Yes 0.8 No 0.5
⋮	⋮

FIG.6A

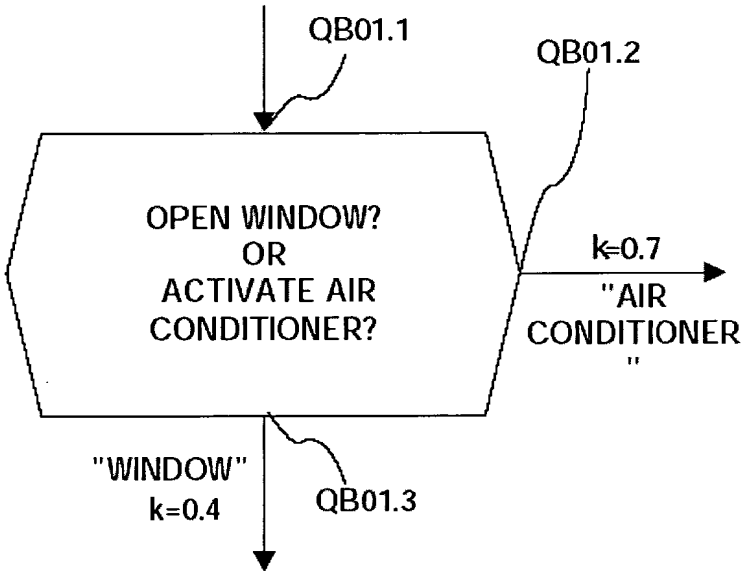


FIG.6B

OUTPUT PROCESS SYMBOL : EXxx	TRANSITION CONSTANT k
EX01 : CLOSE WINDOW +OPERATE AIR CONDITIONER	0.8
EX02 : ACTIVATE AIR CONDITIONER	0.8
EX03 : OPEN WINDOW	0.8
⋮	⋮

FIG.7A

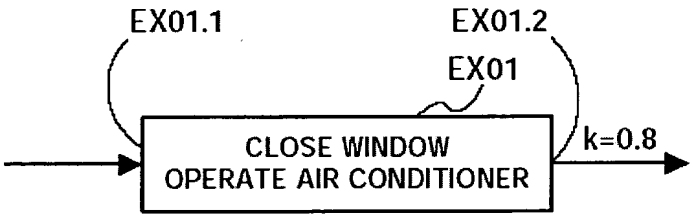


FIG.7B

WIRE NUMBER Wn		PRECEDING NODE		FOLLOWING NODE	WEIGHTING FACTOR J
W1	= From	(TG01.1)	To	(CN01.1),	1.0
W2	= From	(CN01.3)	To	(EX01.1),	0.5
W3	= From	(CN01.2)	To	(QB01.1),	0.5
W4	= From	(TG02.2)	To	(EX03.1),	1.0
W5	= From	(QB01.3)	To	(EX03.1),	0.5
W6	= From	(QB01.2)	To	(EX02.1),	0.5
W7	= From	(EX02.2)	To	(TG03.3),	0.5
⋮					

FIG.8

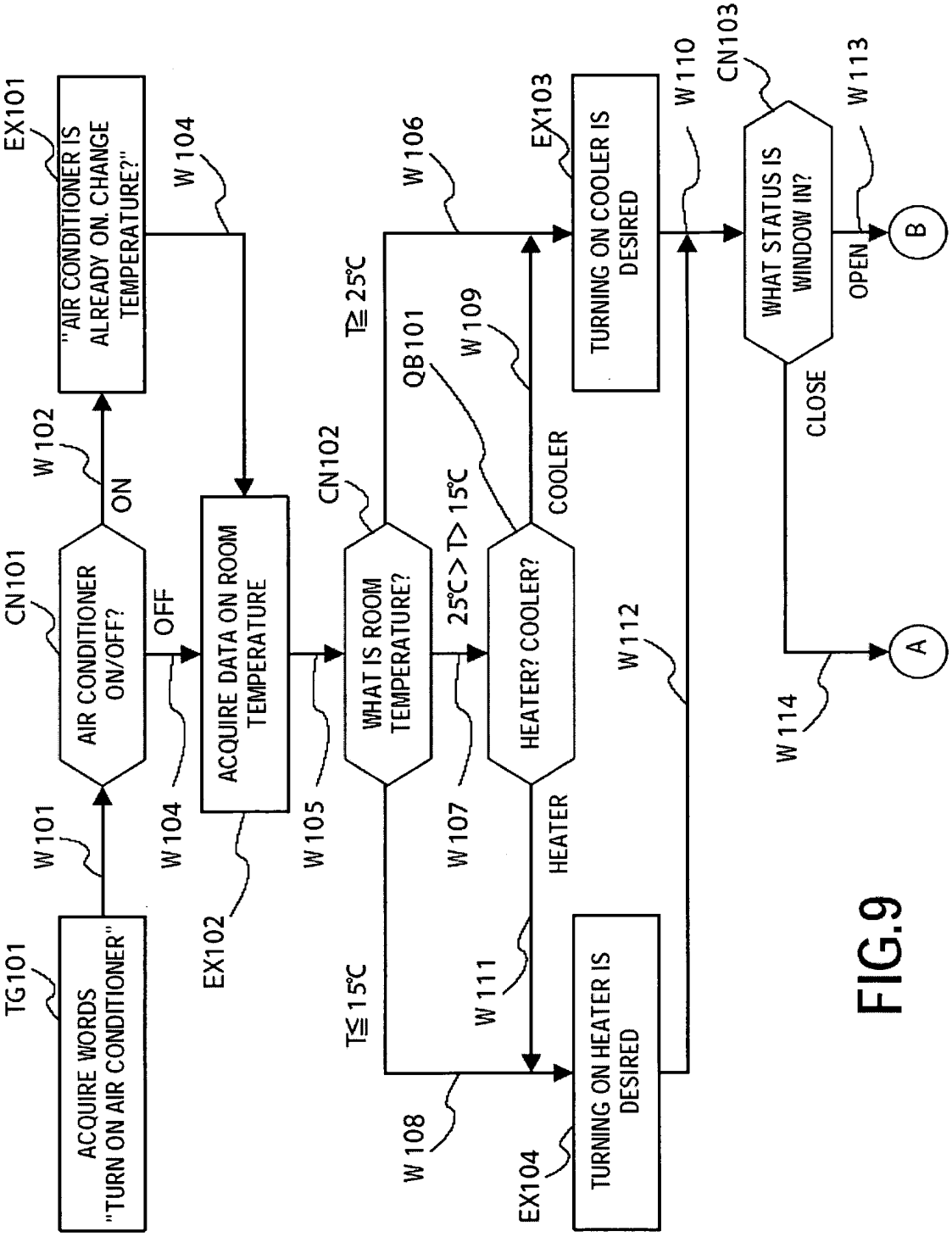

TG101
ACQUIRE WORDS "TURN ON AIR CONDITIONER"
W101
CN101
AIR CONDITIONER ON/OFF?
ON
W102
EX101
"AIR CONDITIONER IS ALREADY ON. CHANGE TEMPERATURE?"
OFF
W104
EX102
ACQUIRE DATA ON ROOM TEMPERATURE
W105
CN102
WHAT IS ROOM TEMPERATURE?
T≦15℃
W108
EX104
TURNING ON HEATER IS DESIRED
25℃>T>15℃
W107
HEATER? COOLER?
HEATER
W111
T≧25℃
QB101
W109
COOLER
W106
EX103
TURNING ON COOLER IS DESIRED
W112
W110
CN103
WHAT STATUS IS WINDOW IN?
OPEN
W113
B
CLOSE
W114
A

FIG.9

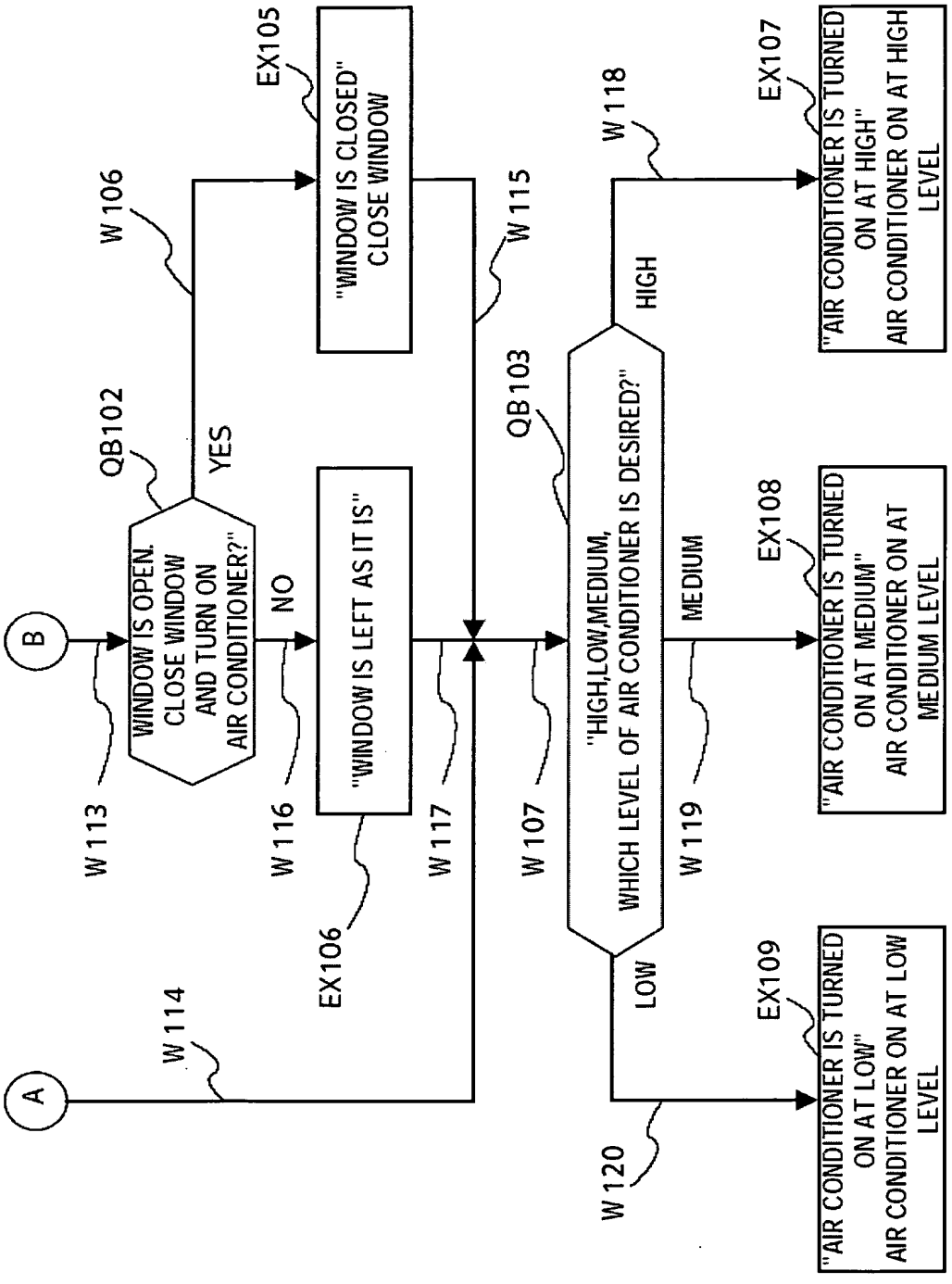

A
B
W 113
WINDOW IS OPEN. CLOSE WINDOW AND TURN ON AIR CONDITIONER?"
QB102
YES
W 106
EX105
"WINDOW IS CLOSED" CLOSE WINDOW
W 115
NO
W 116
"WINDOW IS LEFT AS IT IS"
EX106
W 117
W 114
W 107
QB103
"HIGH,LOW,MEDIUM, WHICH LEVEL OF AIR CONDITIONER IS DESIRED?"
HIGH
W 118
EX107
"AIR CONDITIONER IS TURNED ON AT HIGH" AIR CONDITIONER ON AT HIGH LEVEL
MEDIUM
W 119
EX108
"AIR CONDITIONER IS TURNED ON AT MEDIUM" AIR CONDITIONER ON AT MEDIUM LEVEL
LOW
W 120
EX109
"AIR CONDITIONER IS TURNED ON AT LOW" AIR CONDITIONER ON AT LOW LEVEL

FIG.10

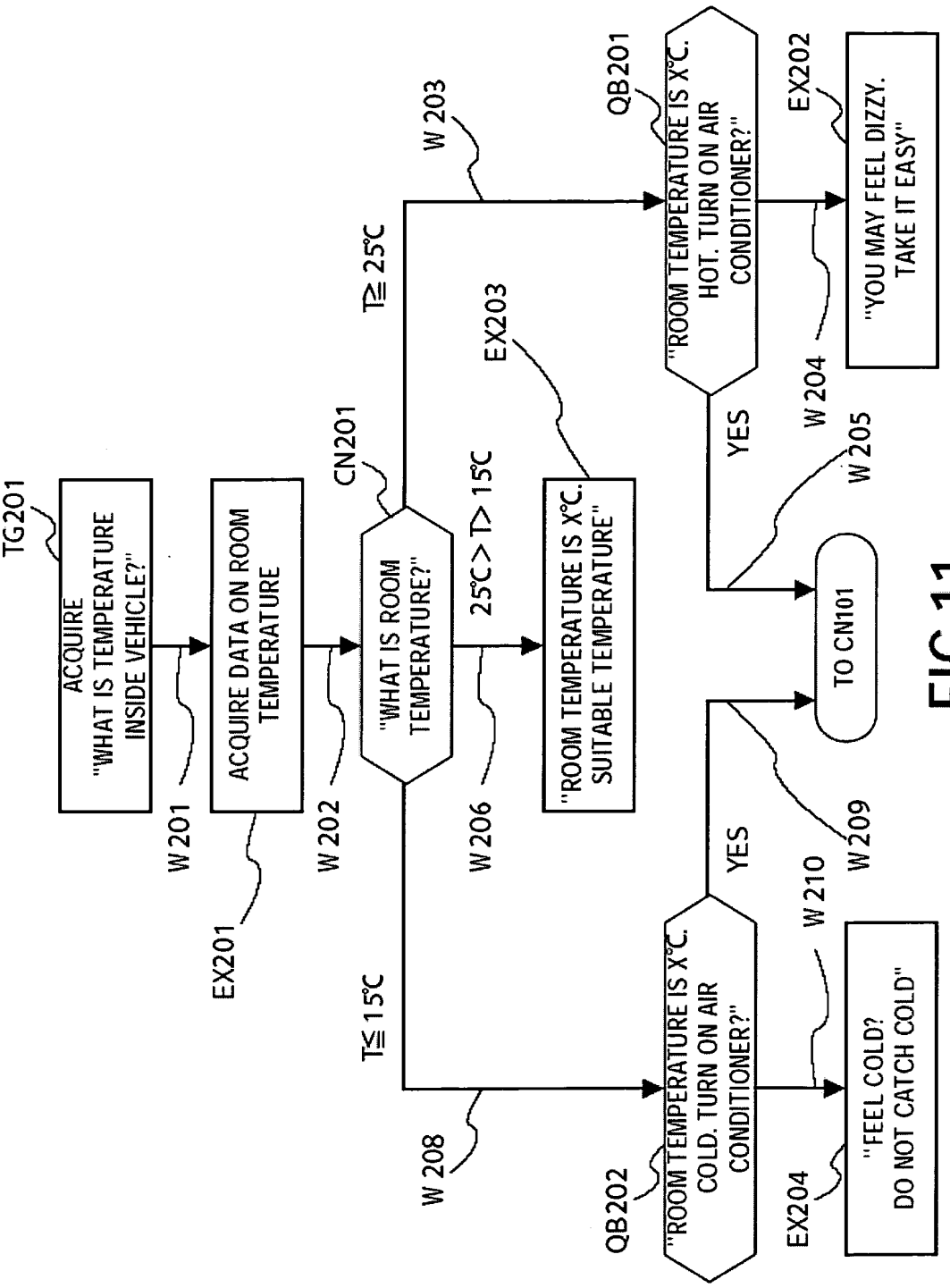

TG201
ACQUIRE "WHAT IS TEMPERATURE INSIDE VEHICLE?"
W 201
ACQUIRE DATA ON ROOM TEMPERATURE
EX201
W 202
CN201
"WHAT IS ROOM TEMPERATURE?"
T≦ 15℃
W 208
T≧ 25℃
W 203
25℃> T> 15℃
W 206
EX203
"ROOM TEMPERATURE IS X℃. SUITABLE TEMPERATURE"
QB201
"ROOM TEMPERATURE IS X℃. HOT. TURN ON AIR CONDITIONER?"
EX202
"YOU MAY FEEL DIZZY. TAKE IT EASY"
W 204
YES
W 205
TO CN101
W 209
YES
QB202
"ROOM TEMPERATURE IS X℃. COLD. TURN ON AIR CONDITIONER?"
W 210
EX204
"FEEL COLD? DO NOT CATCH COLD"

FIG.11

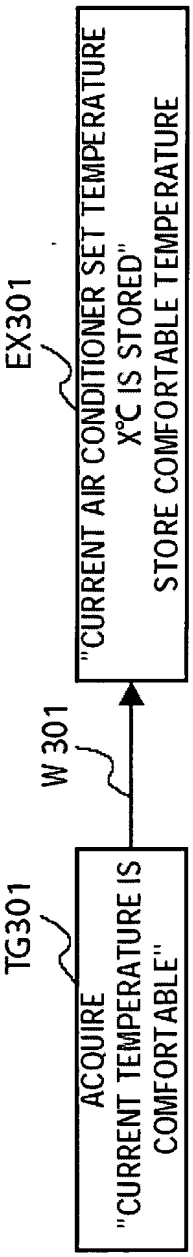


FIG.12A

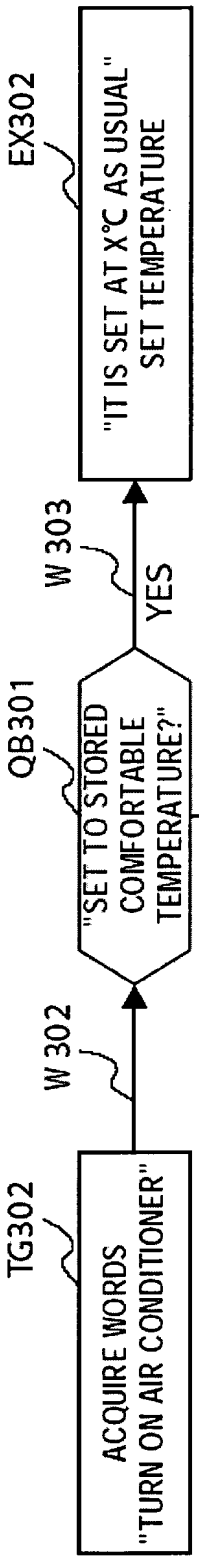


FIG.12B

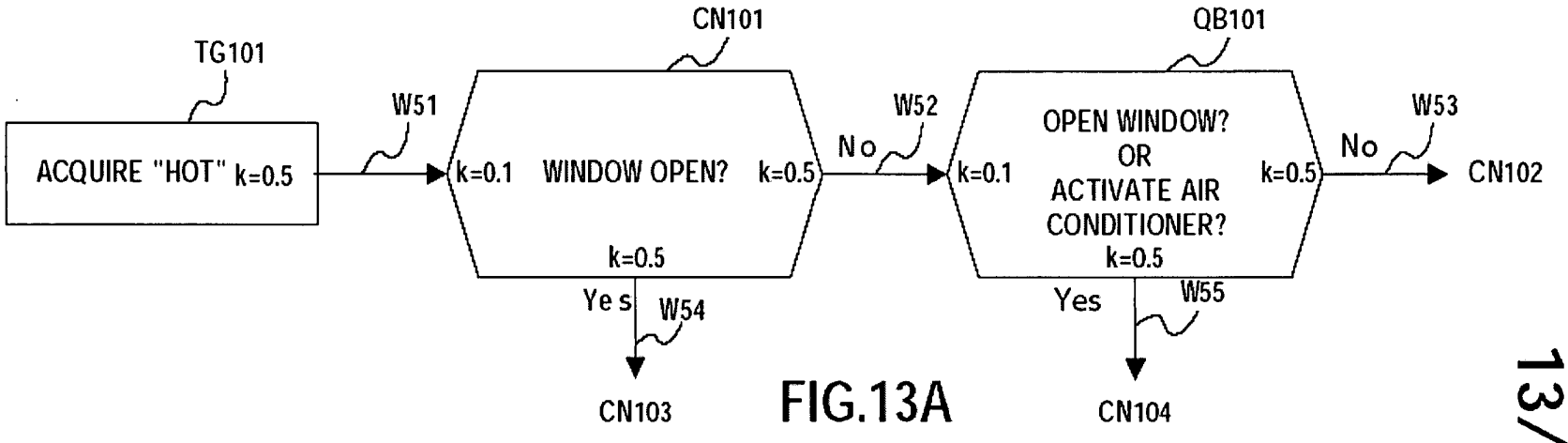


FIG.13A


```
W51 = From (TG101.1) To (CN101.1)
W52 = From (CN101.3) To (QB101.1)
W53 = From (QB101.3) To (CN102.1)
W64 = From (CN101.2) To (CN103.1)
W55 = From (QB101.2) To (CN104.1)
    ⋮
```

FIG.13B

WHEN PROCESS IS IN TG101

```
W51 = 0.5
W52 = 0.25
W53 = 0.125
W54 = 0.25
W55 = 0.125
```

C-1

WHEN PROCESS IS IN CN101

```
W51 = 0.1
W52 = 0.5
W53 = 0.25
W54 = 0.5
W55 = 0.25
```

C-2

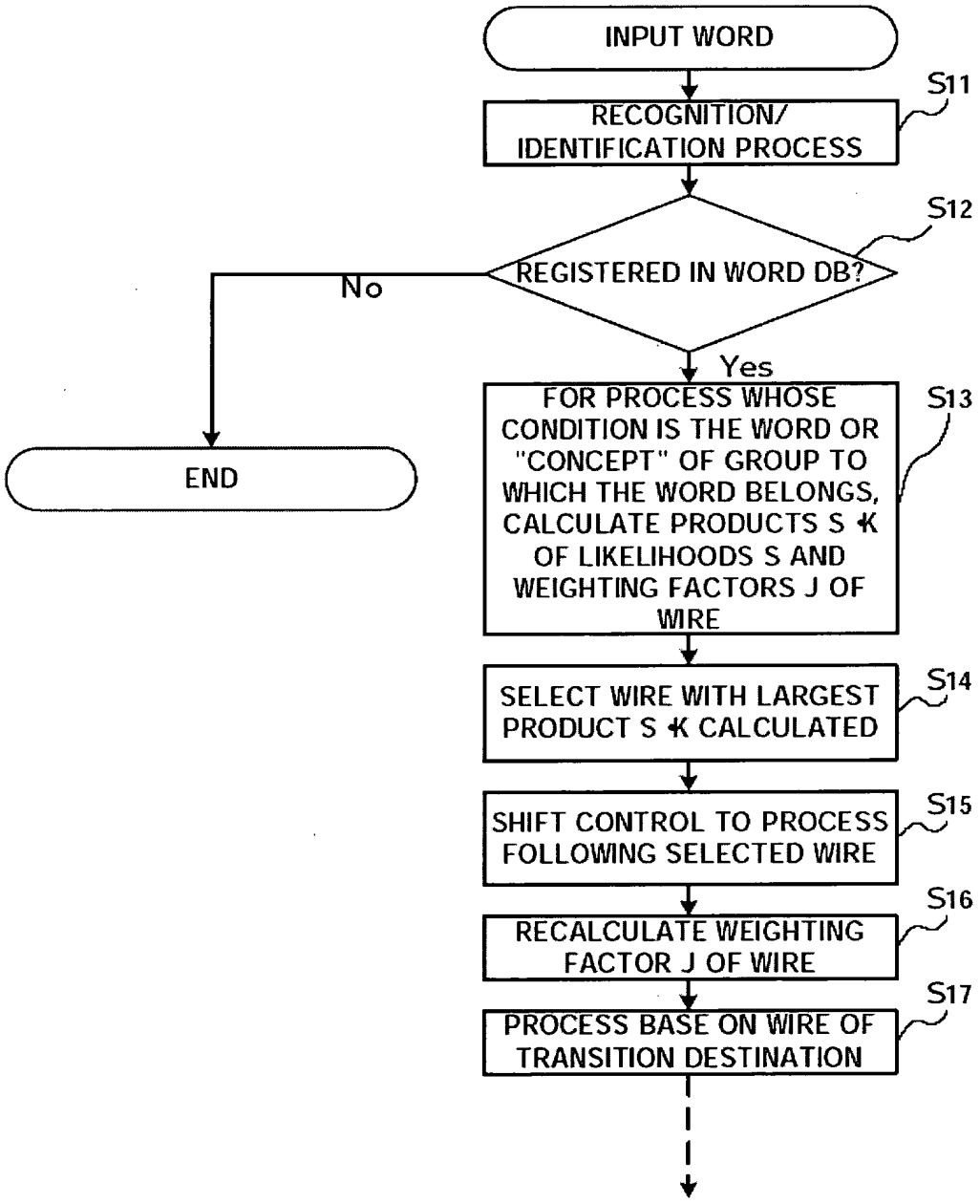
WHEN PROCESS IS IN QB101

```
W51 = 0.01
W52 = 0.1
W53 = 0.5
W54 = 0.05
W55 = 0.5
```

C-3

FIG.13C

FIG.14


INPUT WORD
S11
RECOGNITION/ IDENTIFICATION PROCESS
S12
REGISTERED IN WORD DB?
No
Yes
END
S13
FOR PROCESS WHOSE CONDITION IS THE WORD OR "CONCEPT" OF GROUP TO WHICH THE WORD BELONGS, CALCULATE PRODUCTS S ✕ K OF LIKELIHOODS S AND WEIGHTING FACTORS J OF WIRE
S14
SELECT WIRE WITH LARGEST PRODUCT S ✕ K CALCULATED
S15
SHIFT CONTROL TO PROCESS FOLLOWING SELECTED WIRE
S16
RECALCULATE WEIGHTING FACTOR J OF WIRE
S17
PROCESS BASE ON WIRE OF TRANSITION DESTINATION